Systems Engineering – Accomplishments 1 of 2

- ***Mission CDR - Successful Team Effort***
  - *IRT and Code 300 review teams were very complimentary about the MCDR presentations, including systems, ops, I&T and FSW.*
- ***SADA and APA Qualification & Life Test***
  - *Received technical information supporting life test evaluation*
  - *ROMs received*
- ***AETD Pointing Review***
  - *Review team approved the forward plan for continued performance analysis*
  - *Recommendations made for treatment of uncertainty factors*
  - *Science calibration plan presented to and approved by the review team*
- ***STOP Cycle 3 integrated model completed***
  - *Beginning to run analysis cases*

Systems Engineering – Accomplishments 2 of 2

- ***Mission Robustness Task***
  - *1. Command Authentication task*
  - *2. Augmentation of troubleshooting and diagnostics*
  - *3. Augmented Fault Detection Isolation and Recovery*
- ***POAL and S-band Trades Closed; UCA in work***
  - *POAL – Kickoff meeting 2nd or 3rd week in October*
  - *S-band trade – Update Operations plans and verify coverage by analysis*
- ***Fault Management TIM held at Spectrum September 28th***
  - Agenda topics included action item status from the Re-Entry TIM, comments on the updated FMEA, on-board timers, charge control description, additional DAS alerts, and status of the mission robustness special study.
  - *Action Items to be distributed*
- ***SIRU Test Readiness Review***
  - *The review was successful and there were no issues that would prevent delivery of the unit by the end of the year.*
- ***MAR compliance audit conducted***

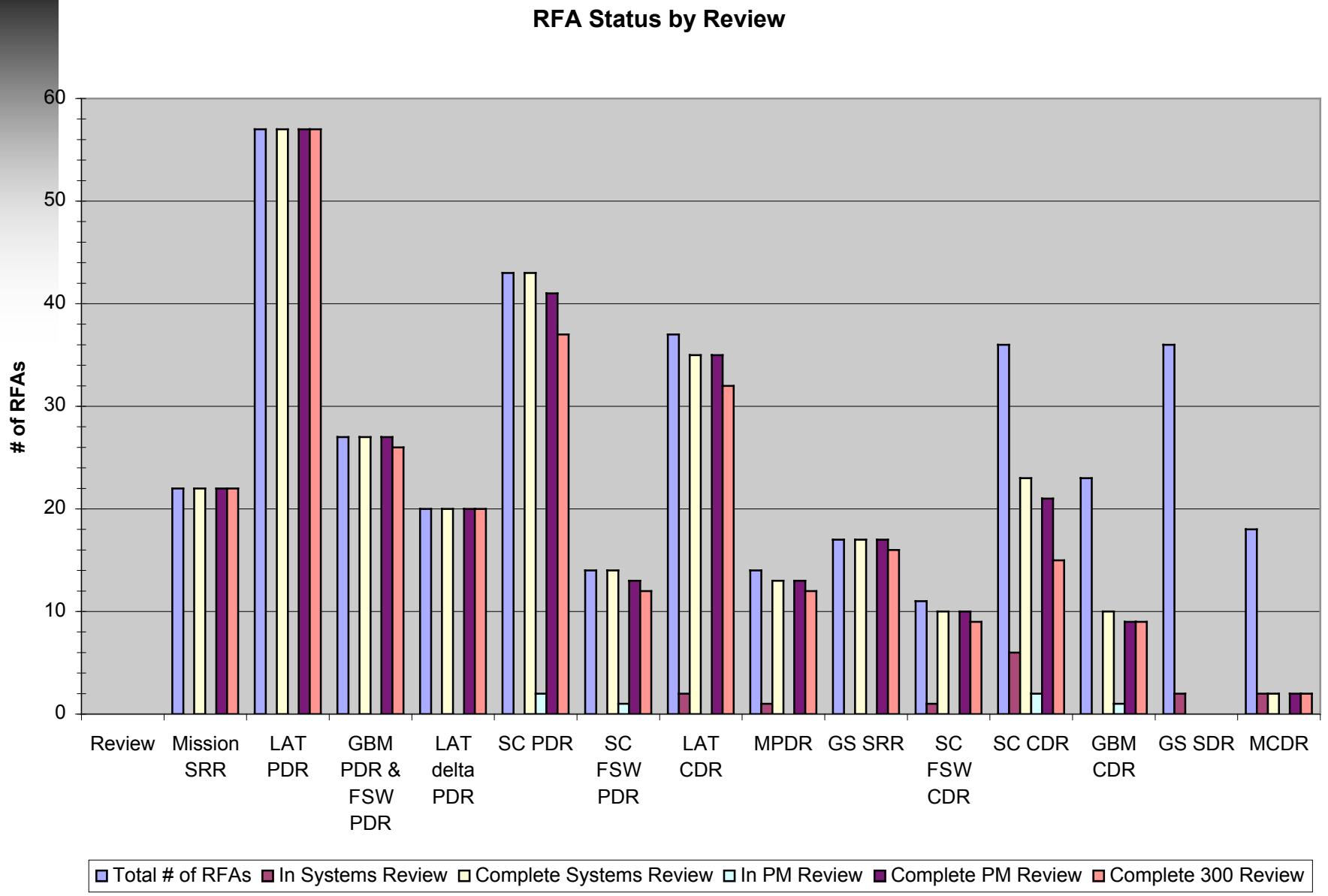
RFA Status

- ***Excellent progress in run RFA closures in run up to MCDR. Since the last PSR RFA report at the end of July:***
  - *Systems approved 38 RFA responses and provided comments to others to be reworked.*
  - *PM approved 52 RFA responses, many of which were reworked in this time period*
  - *Received Originator approval for 48 RFA responses last month.*
  - *All of the LAT PDR RFAs are now closed and the last GBM PDR RFA response was submitted.*
- ***Received official version of GS SDR RFAs. 36 were assigned and the Ground System team is drafting responses.***
- ***Received draft version of the MCDR RFAs. 18 were assigned with 2 closed at the review. 1 recommendation was also assigned. None of these appear to be difficult to close. Expect that all should be able to be closed prior to the end of the year.***

RFA Summary

Review	Total # of RFAs	Systems Review Status		Project Review Status		Code 300 Status	Notes
		In Review	Complete	In Review	Complete	# Closed	
Mission SRR	22		22		22	22	All Closed
LAT PDR	57		57		57	57	All Closed
GBM PDR & FSW PDR	27		27		27	26	1 Open, 1 Withdrawn
LAT delta PDR	20		20		20	20	All Closed
SC PDR	43		43	2	41	37	6 Open
SC FSW PDR	14		14	1	13	12	2 Open
LAT CDR	37	2	35		35	32	5 Open
MPDR	14	1	13		13	12	2 Open
GS SRR	17		17		17	16	1 Open
SC FSW CDR	11	1	10		10	9	2 Open
SC CDR	36	6	23	2	21	15	21 Open
GBM CDR	23		10	1	9	9	14 Open
GS SDR	36	2					
MCDR	18	2	2		2	2	2 Closed at review
Totals	375	14	293	6	287	269	

RFA Response Summary Chart



Peer Review RFA Status

- ***Spacecraft Pre-CDR Peer Reviews***
  - *Received Originator approval for 88 RFA and 41 recommendation responses, out of a total of 122 RFAs and 46 recommendations*
  - *14 RFAs and 1 recommendation closed this month*
  - *95 RFAs have passed the Systems Review process and been sent to the Originators*
  - *Spectrum has stated that they want to complete all open responses by the end of October*
- ***LAT Pre and Post CDR Peer Reviews***
  - *Only 1 RFA remains open from each of the following reviews: the Pre-CDR peer reviews, the X-LAT Review, the TEM PS Review*
  - *"Discovered" 5 RFAs from TEM PS Peer Review in early September and closed 4 prior to MCDR*
- ***AETD Pointing Review***
  - *No new RFAs received at 2nd review.*
  - *Working on submitting last 2 unsubmitted responses*

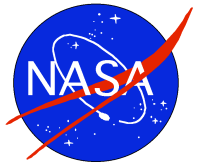
Peer Review RFA Summary

Review	Total # of RFAs	Total # of Recomm	RFA Responses Presented	RFA Responses Accepted	Project Review Status 1	2	3	4	Completed Project Review	Originator Status # Closed	Notes
Systems	12	9	12	12	1	5	1	4	9	9	Includes 1 Withdrawn
I&T	14	1	14	11	1	6	2	5	11	11	
Structural Design	5	2	5	5			2	3	5	5	All Closed
Thermal	6	6	6	6			4	2	6	6	All Closed
Mechanisms	2	3	2	2			1	1	2	2	All Closed
C&DH	14	3	13	11	2	4	3	1	10	10	
COMM	22	2	22	21	3	4	3	11	16	13	
EPS	20	3	19	15	2	3	6	4	14	14	
GNC	6	4	6	6	1		3	2	5	3	
Fault Management	15	6	11	11		2	4	5	11	10	
Structural Analysis	6	7	6	6			4	2	6	5	
Totals	122	46	116	106	10	24	33	40	95	88	

Review	Total # of Recomm	# Closed by Orig
Systems	9	6
I&T	1	1
Structural Design	2	2
Thermal	6	5
Mechanisms	3	3
C&DH	3	3
COMM	2	2
EPS	3	3
GNC	4	4
Fault Management	6	5
Structural Analysis	7	7
Totals	46	41

Review	Total # of RFAs	Approved by Originator	Notes
LAT CDR Peer Reviews	177	176	
LAT CAL-Grid Peer	7	7	All Closed
LAT Power Supply Peer	6	5	
LAT X-LAT Peer Review	8	7	
GBM DPU CDR	7	7	All Closed
GBM PB/DET CDR	38	38	All Closed
AETD Pointing Peer #1	13	7	

Systems Engineering Milestones



		Planned	Actual
System	AETD Pointing Knowledge Review #1	5/1/04	5/1/2004
	Defined Mission Robustness Task	6/1/04	6/1/2004
	Defined S-band Antenna Architecture Trade Study	6/1/04	6/1/2004
	Defined Power On at Launch Trade Study	6/1/04	6/1/2004
	Deliver coupled loads analysis (CLA) models to KSC and Boeing	7/1/04	7/1/2004
	Closed GBM thermal design analysis	7/1/04	7/1/2004
	Initial review of SC FMEA	7/1/04	7/1/2004
	Complete Power on at Launch Trade Study	8/1/04	8/1/2004
	Complete S-band Antenna Architecture Trade Study	8/1/04	8/1/2004
	AETD Pointing Knowledge Review #2	9/1/04	9/30/2004
	SVP Baselined	9/1/04	9/30/2004
	JSC ORSAT Results returned	9/1/04	9/30/2004
	MCDR Complete	9/1/04	9/30/2004
	Assess CLA results from Boeing	10/1/04	
	Mission Robustness Command Authentication Subtask Complete	10/1/04	
	Mission Robustness Augmentation of Diagnostic and Troubleshooting Capability Subtask Com	10/1/04	
	Mission Robustness Fault Detection, Isolation and Recovery Subtask Complete	11/1/04	

Mass Budget September 2004

	Mass (kg)			
	Allocation	Estimate	Margin	%
Dry SC	1154	1026	128	12.5
SC including propellant	1512	1384	128	9.3
LAT	3000	2779	221	8.0
GBM	115	101	14	13.4
Observatory mass	4627	4264	363	8.5

Delta II Heavy Payload Planners Guide throw weight to 575 km with cg at 1.37 m = 4627 kg
Center of Gravity (cg) CBE = 1.33 m
Boeing Preliminary PAF strength analysis Feb 2004 indicates: 1.59 m cg capability at 4248 kg
1.48 m cg capability at 4627 kg

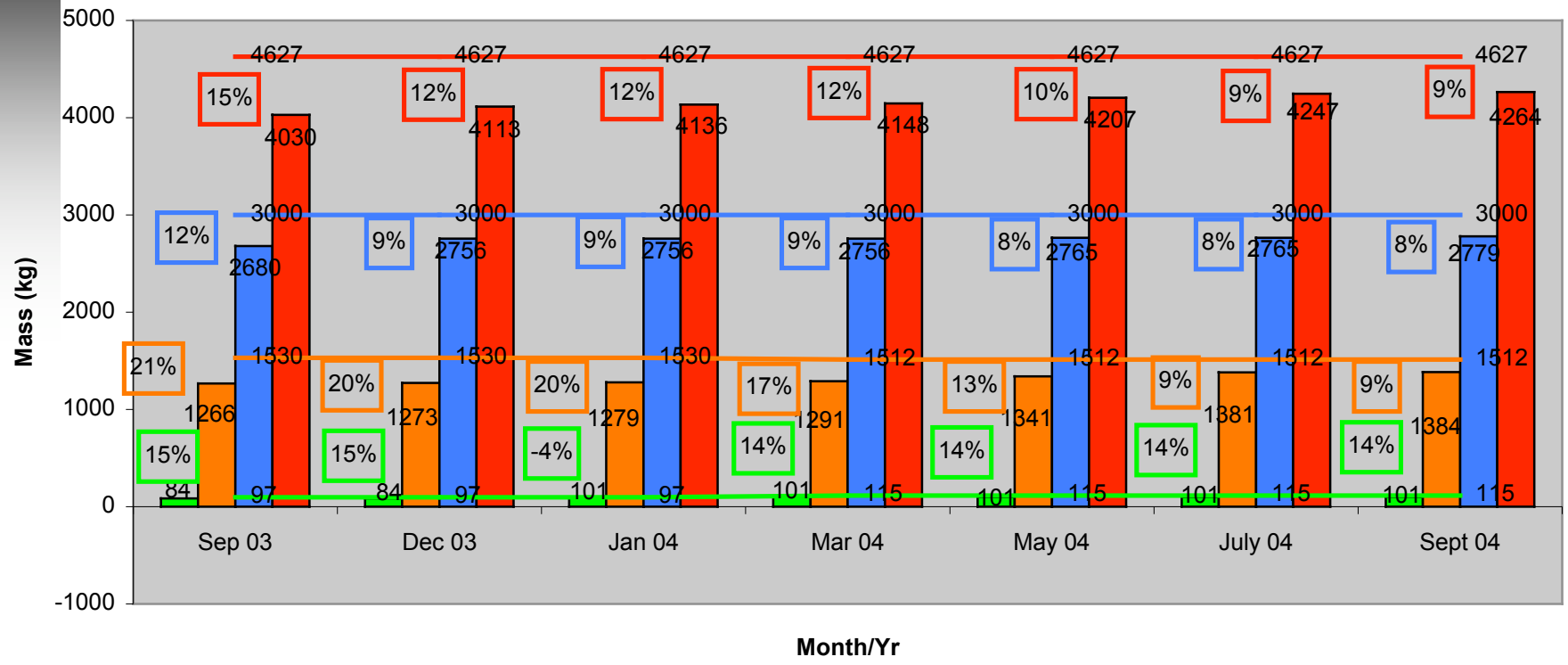
57% of LAT mass estimate is measured
LAT is carrying 18% margin on the unmeasured LAT mass of 1195 kg

AIAA guidelines: **5% mass margin for SC at CDR**

10% for LAT at CDR

10% for GBM at CDR

Observatory Mass Growth



Power Budget September 2004

	Orbit Average Power (Watts) Allocation	Estimate	Margin	%
Spacecraft	925	821	104	12.7
LAT	650	541	109	20.1
GBM	105	100	5	5.0
Project Reserve	20	0	20	N/A
Observatory total	1700	1462	238	**16.3**

LAT Orbit Average Survival Power

Allocation	**278 W**	**= Regulated VCHP power 58 W + Unregulated Passive Survival Power 220 W**
CBE	**230.4 W**	**= Regulated VCHP power 48.4 W + Unregulated Passive Survival Power 182 W**
Margin	**20.7%**	

Estimates do not reflect transition into or out of survival mode, only steady state orbit average.

72% of LAT science mode power (390 W) is categorized as measured.
LAT is carrying 72% margin on unmeasured power of 151 W.

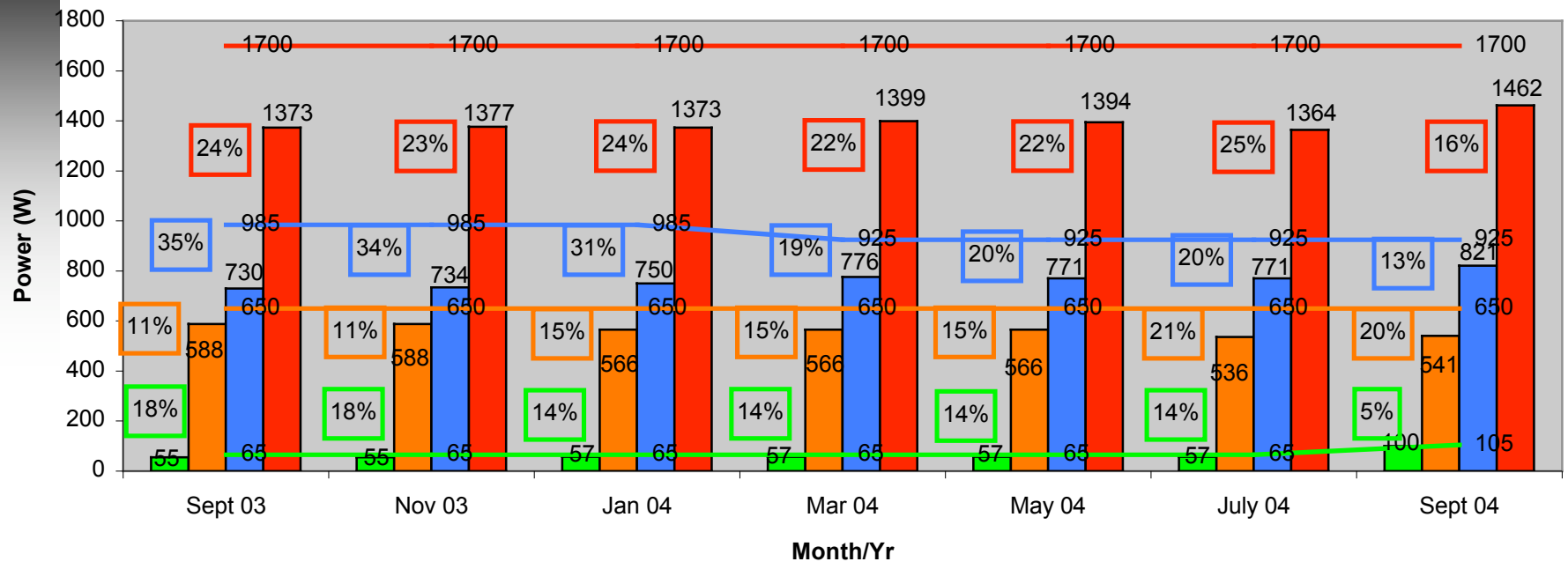
AIAA guidelines: **10% power margin for SC at CDR**

15% for LAT at CDR

15% for GBM at CDR

10-06-2004

Observatory Power Growth



GBM Power	LAT Power	Spacecraft Power	Observatory Power
GBM Margin	LAT Margin	SC Margin	Obs Margin
GBM Allocation	LAT Allocation	SC Allocation	Observatory Capability

Observatory Thermal Metrics

	Spacecraft (Per GD 9/8/04)	LAT (CDR 5/12/03)	GBM (NAI (12)+BGO(2)) (Post CDR 8/27/04)
Number (1) or Types (2) of Components w Temp. Limits	48 (2)	13 (2)	14 (1)
Number of Components w Temp. Exceedances	0	0	0
Number of Components w Temp. Margin Exceedances	0	0	2
Number of dT/dt Limits	1 (GPS Ant)	1	1
Number of dT/dt Exceedances	0	0	0
Number of dT/dx, dT/dy, dT/dz Limits	2 (Opt Bench, Battery)	0	0
Number of dT/dx, dT/dy, dT/dz Exceedances	0	0	0
Op Orbit Average Heater Pow Margin (vs. Allocation)	10%	63%	7%
Surv Orbit Average Heater Pow Margin (vs. Allocation)	31%	28%	13%
Radiator Area Margin (vs. Effective Available)	<10%	0%	<10%

Margin Exceedances:
NAI-4 and NAI-6 Detectors have slight exceedance caused by LAT/SC closeout that is currently in work.

Definitions:

Temperature Margin Philosophy: Predictions demonstrate +/- 5C against Allowable Flight Temperature (AFT) Limits
Note: For heater controlled areas, 5C margin is waived on cold end in lieu of heater duty cycle margin.

Temperature Exceedance: Predict > AFT
Temperature Margin Exceedance: AFT - Predict < 5C

Op Heater Power Margin (Orbit Average): (Allocation-Predict)/Allocation *100
Surv Heater Power Margin (Orbit Average): (Allocation-Predict)/Allocation * 100
Note: Heaters are sized to maintain a 30% control authority margin at minimum bus voltage.

Radiator Area Margin: (Effective Available-Utilized)/Effective Available * 100